June 14, 1996

Mr. William F. Caton
Acting Secretary
Office of the Secretary
Federal Communications Commission
1919 M Street, N.W., Room 222
Washington, D.C. 20554

RE: Notice of Proposed Rule Making
ET Docket No. 96-8

Dear Mr. Caton:

Please accept these comments of Fusion Systems Corporation (Fusion), in response to the Commission's Notice of Proposed Rule Making ("Notice") in ET Docket No. 96-8. Fusion may also wish to file additional comments or materials in reply to other comments submitted in this docket.

As an industry leader in the design and production of industrial equipment using the 2450 MHz ISM band, Fusion is in a unique position to apprise the Commission of the serious potential interference problems which threaten any communications systems that share this heavily used band. In ET Docket No. 94-32, Fusion filed comments similar to these, in which it urged the Commission not to allocate any of the 2450 MHz ISM band for secondary usage by developing mobile and/or fixed service technologies unless it was absolutely certain that such technologies could co-exist with ISM applications in both industrial and residential environments. Because the rule proposals in this docket seek to encourage increased use and reliance on both the 2450 MHz and 5800 MHz ISM bands for communications systems without regard to their susceptibility to interference from nearby ISM equipment, Fusion again raises these concerns.

Fusion submits that it is the users of the in-band systems who will ultimately suffer, with no recourse, due to the

primary spectrum rights accorded to ISM operations. Accordingly, Fusion believes that both manufacturers and users of such equipment should be cautioned in the rules themselves that in-band interference may be intolerable unless susceptibility standards are applied to these systems. Fusion further urges the Commission to encourage manufacturers of in-band systems to adopt voluntary immunity standards similar to those under development by the European Telecommunications Standards Institute (ETSI) and other industry organizations.

Fusion's Microwave Lamp Technology

Fusion began operations as an entrepreneurial start-up in 1971 to develop and market high power industrial ultraviolet lamp systems powered by microwave energy. In developing its products, Fusion relied upon and worked within established FCC and international requirements. In reliance upon these allocations, Fusion created a unique and valuable technology requiring the entire use of the ISM band. Fusion has successfully manufactured and marketed its products in the U.S. and globally to a large number of important industries which now rely upon this technology to keep their own production lines in operation. Today, Fusion is a $110 million NASDAQ-traded company with a number of commercial products using 2450 MHz microwave-driven lamp systems in the 1500-6000 Watt range.

Fusion is the world leader in the production of microwave lamps, with an installed base worldwide in excess of 13,000 units. Fusion currently employs 580 people in its Maryland headquarters where all manufacturing takes place. Fusion's business is global, with approximately 50% of sales abroad, resulting in a net benefit to the U.S. trade balance. Fusion Japan, K.K. is a wholly-owned subsidiary located in Tokyo, and holds a significant share of the market in Japan. Fusion also has a European subsidiary based near London and a Pacific subsidiary in Korea

Fusion lamps are used in the production of such critical advanced products as semiconductor chips and optical fibers. Virtually all fiber-optic cable is made using microwave

powered ultraviolet lamps for drying of protective coatings applied to the glass fibers. Advanced semiconductor integrated circuits are produced with microwave powered photostabilizer and asher equipment. Fusion lamp systems provide an ecologically preferable alternative to thermal ovens in numerous applications, providing non-polluting drying of industrial inks and coatings. An example is the drying of printing on 2.5 billion Coors beverage cans annually. Fusion lamp systems are also used in the production of automobile glass and headlamps, no-wax floor tiles, and a wide variety of medical, electronic, packaging and other products. New applications involving ISM equipment, known as a microwave down stream ashers, are used in the semiconductor industry for photoresist cleaning.

Fusion's Products Use the Entire 2450 MHz ISM Band

Fusion products depend critically on use of the full 100 MHz bandwidth and on the 2450 MHz center frequency. It was only through using the entire band that Fusion was able to make the breakthroughs necessary to overcome the prior limitations of microwave lamps.

Fusion uses commercial ISM magnetrons (Hitachi 2M130 and 2M131) developed for microwave ovens. These magnetrons experience small shifts of frequency as a function of load. When a microwave lamp starts operating, the load it presents to a magnetron must change significantly, thus forcing the frequency of the magnetron oscillation to shift. Depending on the system design, this shift can be 10-20 MHz.

In addition, Fusion's 10 inch long tubular lamps of which over 10,000 are sold each year, use matched pairs of magnetrons which are separated by 30 MHz to prevent the magnetrons from phase locking with each other. Further, the frequency separation is necessary to allow rapid lamp start-up, a major competitive advantage of our microwave lamp technology compared to electrode arc lamps. The net result is that when other factors, such as aging, are taken into effect, magnetrons can emit signals at 2450 MHz ±40 MHz or more. For this reason

the full ±50 MHz bandwidth is necessary for the proper design and function of Fusion products.

Fusion equipment sold in 1976 remains in service 24 hours a day in factories in the U.S. and abroad. Equipment being sold today will be in service well into the 21st century. This equipment is installed in such leading U.S. companies as AT&T, IBM, Motorola, Corning, Intel, Texas Instruments, Hewlett Packard, Coors, Ford GM and many others.

Fusion Cautions Against Use of the 2450 MHz ISM Band for Communication Services

Fusion and other ISM equipment manufacturers have come to rely on the primary usage, accorded internationally, for systems using the 2450 MHz band. Fusion has invested substantial capital in its ISM production technologies and has been successfully turning out products on a worldwide basis that are energy efficient and pollution free. Fusion notes also, that there exist over 80 million microwave ovens operating in the 2450 MHz band in residential and commercial environments throughout the U.S.

Because of this high in-band usage by ISM devices, Fusion urges the Commission to avoid adopting any rule changes that will spur the development of communication services not fully capable of co-existing on a secondary basis to ISM applications in all environments. The unlicensed telecom systems described in the petitions and the Commission's Notice, appear to be incompatible with existing widespread ISM usage in the 2450 MHz band. Despite the apparent willingness of equipment vendors to assume such risk, Fusion believes that such obvious incompatibility is unfair to the public and can only lead to pressures on ISM manufacturers to limit operations or reduce their in-band requirements. However, such pressures stem from false hopes as aptly demonstrated by the industry's vehement protest to a preliminary 1992 WARC proposal to reallocate part of the 2450 MHz band for non-ISM applications. Those unfounded efforts were quickly abandoned by the Commission when the

industry underscored the widespread economic harm that would be inflicted on the public by the curtailment of ISM operations.

A workable solution to in-band interference, Fusion submits, lies in the application of equipment susceptibility standards, similar to those now legally required for nearly all equipment sold in Europe. Many in the industry, have long recognized the problems inherent in our current "asymmetric" regulatory system which does not couple equipment immunity with radiated emission limits. That the Commission is becoming sensitive to these issues and is taking steps to address growing immunity concerns can be seen in its current rule making in MM Docket No. 96-62, which seeks to resolve blanketing interference to consumer electronics and other communications devices.

For these reasons, Fusion urges the Commission to adopt, in its rules, specific references to relevant immunity standards such as PrETS 300-683, currently under development by ETSI, for any equipment that will use the ISM bands for non-ISM operations. At the very least, Fusion urges the Commission to warn manufacturers and users of the need to employ such standards to reduce or minimize the likelihood of unacceptable levels of interference to in-band operations.

Sincerely,

Mohammad Kamarehi
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Fusion Semiconductor
Fusion Systems Corporation